Inventors: Chong Hun Yi
Joanne E. Shipe

ELECTRICAL CONNECTOR WITH SHOCK SUPPORT

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to an electrical connector, and particularly to an electrical connector with shock support.

2. Description of Related Art

[0002] Card edge connectors, such as a PCI and a PCI Express connectors, are widely used to connect daughter Printed Circuit Boards (PCBs) and mother PCBs. Typically, each of the card edge connectors has an elongate insulative housing and a plurality of signal terminals retained in the insulative housing. The insulative housing defines an elongate receiving slot for receiving the daughter PCB. In common, a tower is formed on the insulative housing at a lateral end thereof and functions as a shock support. Thus, a large space of the mother PCB is occupied by the tower and is wasted. On the other hand, if there is power to transmit, a separate power connector is required to be mounted on the mother PCB. Thus, some space is wasted. For fast developing science, the PCB is reduced in size and has no redundant space to waste for the tower and the separate power connector.

[0003] Hence, an improved card edge connector with improved shock support is required to overcome the disadvantages of the conventional card edge connector.

SUMMARY OF THE INVENTION

[0004] Accordingly, an object of the present invention is to provide a card edge connector having a tower with a power contact retained therein.

[0005] In order to achieve the object set forth, an electrical connector of the present invention is adapted for electrically receiving a daughter PCB. The electrical connector comprises an insulative housing, a signal terminal retained in the insulative housing and a power contact. The insulative housing includes a receiving slot for an insertion of the daughter PCB and a tower functioning as a shock support. The power contact is received in the tower for electrically connecting with the daughter PCB.

[0006] Other objects, advantages and novel features of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIG. 1 is a top, front and right perspective view of an electrical connector in accordance with a first embodiment of the present invention, a mother PCB and a daughter PCB;

[0008] FIG. 2 is an assembled view of the electrical connector of FIG. 1;

[0009] FIG. 3 is a partial, cross-sectional view of the electrical connector in FIG. 2;

[0010] FIG. 4 is a cross-sectional view of the electrical connector of FIG. 2, showing a daughter PCB received in the electrical connector;

[0011] FIG. 5 is a cross-sectional view of the electrical connector of FIG. 2, showing an engagement between a power contact and the daughter PCB;

[0012] FIG. 6 is a front, right perspective view of an electrical connector in accordance with a second embodiment of the present invention;

[0013] FIG. 7 is a front, right perspective view of an electrical connector in accordance with a third embodiment of the present invention;

[0014] FIG. 8 is a front, right perspective view of an electrical connector in accordance with a fourth embodiment of the present invention; and

[0015] FIG. 9 is a front, right perspective view of an electrical connector in accordance with a fifth embodiment of the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0016] Reference will now be made to the drawing figures to describe the present invention in detail.

[0017] Referring to FIGS. 1 and 2, a card edge connector 1 in accordance with a first embodiment of the present invention is shown. The electrical connector 1, such as a PCI connector or a PCI Express connector, includes an elongate insulative housing 2, a plurality of signal terminals 3 received in the insulative housing 2 and a pair of power contacts 4 retained in the insulative housing 2.

[0018] The insulative housing 2 includes a substantially rectangular dielectric base 20 and a tower 22 at a lateral end thereof. Furthermore, the insulative housing

2 defines a central receiving channel 200 in both the dielectric base 20 and the tower 22 for receiving a complementary daughter PCB 6. The dielectric base 20 defines two rows of opposite receiving passageways 202 communicating with the receiving channel 200. In addition, the dielectric base 20 includes a guiding wall 203 and a guiding pole 201 extending downwardly from a bottom surface thereof for being engageably received in a mother PCB 5 on which the electrical connector 1 is mounted.

[0019] The tower 22 includes a pair of opposite base portions 220 and the channel 200 is defined between the two base portions 220. Each base portion 220 defines a pair of opposite receiving slots 222 for receiving the power contacts 4. The receiving slots 222 communicate with the receiving channel 200 at a bottom thereof.

[0020] The power contacts 4 each include a pair of opposite retaining plates 40, a connecting arm 44 connecting the two retaining plates 40 together, a pair of soldering tails 41 respectively offsetting from a bottom end of the retaining plates 40 and a pair of offsetting mating arms 42 extending from a lower end of the retaining plates 40. The retaining plates 40 and the connecting arm 44 together defines a receiving recess 45 for receiving the daughter PCB 6. The mating arms 42 each comprise a horizontal arm 420 extending horizontally from the lower end of the retaining plate 40 and a curved contacting arm 421 extending upwardly and inwardly from an end of the horizontal arm 420.

[0021] In assembly, the power contacts 4 and the signal terminals 3 are inserted into the insulative housing 2 from a bottom-to-top direction. The signal terminals 3 are received in the receiving passageways 202 with contacting portions (not shown) thereof projecting into the receiving channel 200 for electrical connecting with corresponding golden fingers 60 of the daughter PCB 6. The power contacts 4 are received in the tower 22 with the retaining plate 40 respectively received in the receiving slots 222. The inner walls 224 of the tower 22 are received in the receiving recesses 45 of the power contacts 4.

[0022] While the electrical connector 1 is mounted on the mother PCB 5, the signal terminals 3 and the power contacts 4 are soldered on the mother PCB 5. Referring to FIGS. 4 and 5, in assembling the daughter PCB 6 to the electrical connector 1, the daughter PCB 6 is received in the receiving channel 200 of the insulative housing 2 with golden fingers 60 of the daughter PCB 6 respectively contacting with the signal terminals 3 and the mating arms 42 of the power contacts 4. The guiding wall 203 of the insulative housing 2 is received in a first guiding recess 61 of the daughter PCB 6 and the connecting arms 44 of the power contacts 4 are engageably received in a second guiding recess 62 of the daughter PCB 6.

[0023] FIG. 6 shows a design in accordance with a second embodiment of the present invention. In this embodiment, the configurations of the signal terminals 3a and the insulative housing 2a are similar to those of the first embodiment, so descriptions thereabout are omitted herefrom. A tower 22a is formed on the insulative housing 2a and defines a pair of opposite receiving slot 222a

communicating with a receiving channel 200a of the insulative housing 2a at a top end thereof. A pair of opposite power contacts 4a is inserted into the tower 22a from a top-to-bottom direction and each have a substantial H-shape. Each power contact 4a comprises a pair of opposite retaining plates 40a, a connecting arm 44a connecting the retaining plates 40a together and a pair of offsetting mating arms 42a respectively extending downwardly from a top end of the retaining plates 40a. The relationships between the power contacts 4a and the insulative housing 2a are similar to those of the first embodiment, so descriptions thereabout are omitted herefrom.

[0024] FIG. 7 shows a design in accordance with a third embodiment of the present invention. In this embodiment, the configurations of the insulative housing 2b and the signal terminals 3b are similar to those of the first embodiment, so descriptions thereabout are omitted herefrom. A plurality of power contacts 4b is inserted into the insulative housing 2b from a bottom-to-top direction. Each of the power contact 4b comprises a pair of retaining plates 40b, a connecting arm 44b connecting the retaining plates 40b and a pair of soldering tails 41b extending downwardly from the connecting arm 44b. A pair of offsetting mating arms 42b extends downwardly and inwardly from an inner side of the retaining plates 40b. The relationships between the power contacts 4b and the insulative housing 2b are similar to those of the first embodiment, so descriptions thereabout are omitted herefrom.

[0025] FIG. 8 shows a design in accordance with a forth embodiment of the present invention. In this embodiment, the configurations of the insulative housing 2c and the signal terminals 3c are similar to those of the first embodiment, so descriptions thereabout are omitted herefrom. The insulative housing 2c is formed with a tower 22c at a distance from a lateral end thereof. A power contact 4c is inserted into the tower 22c from a top-to-bottom direction. The power contacts 4c comprises a pair of retaining plates 40c, a connecting arm 44c connecting the retaining plates 40c together, a pair of soldering tails 41c respectively extending downwardly from a bottom end of the retaining plates 40c, and a pair of mating arms 42c extending upwardly and inwardly from the bottom end of the retaining plates 40c. The relationships between the power contacts 4c and the insulative housing 2c are similar to those of the first embodiment, so descriptions thereabout are omitted herefrom.

[0026] FIG. 9 shows a design in accordance with a fifth embodiment of the present invention. In this embodiment, the configurations of the insulative housing 2d and the signal terminals 3d are similar to those of the first embodiment, so descriptions thereabout are omitted herefrom. The insulative housing 2d is formed with a tower 22d at a distance from an end of the insulative housing 2d. The power contact 4d is inserted into the tower 22d from a bottom-to-top direction and comprises a pair of retaining plates 40d, a pair of soldering tails 41d extending downwardly from a bottom end of the retaining plates 40d, a pair of upper and lower connecting arms 44d, 45d connecting the retaining plates 40d together. A pair of offsetting mating arms 42d extending downwardly from the upper connecting

arms 44d. The relationships between the power contacts 4d and the insulative housing 2d are similar to those of the first embodiment, so descriptions thereabout are omitted herefrom.

[0027] It is to be understood, however, that even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosure is illustrative only, and changes may be made in detail, especially in matters of shape, size, and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.